Test # 11

1. As a chemical reaction occurs the reaction rate decreases.

2. The overall order of the reaction is 4.

3. I would expect reaction II to have the largest rate constant.

4. An increase in temperature increases the rate of a chemical reaction because it creates an increase in the amount of collisions

5. $R = K(H_2O_2)(I^-)$

$1.15 \times 10^{-6} \frac{M}{sec} = K(0.010)(0.010)$

$1.15 \times 10^{-6} M/sec = K(1 \times 10^{-4})$

$\frac{1.15 \times 10^{-6} M/sec}{1 \times 10^{-4}} = K$

$K = 0.012 \frac{1}{M(sec)}$

$\boxed{R = 0.012 \frac{1}{M \cdot sec}(H_2O_2)(I^-)}$

order of H_2O_2: 1

order of I^-: 1

order of H_3O^+: 0

overall order: 2

$\frac{16}{16}$

100%

6. The reaction in problem #5 is not an elementary reaction

7. Initial: 2.00 M
after 3.5 hrs. 0.125 M

$\frac{\ln\left(\frac{0.125}{2.00}\right)}{3.5} = \frac{-K(3.5)}{3.5}$

$\frac{\ln\left(\frac{1}{16}\right)}{3.5} = -K$

$K = 0.792$

$t_{1/2} = \frac{\ln 2}{0.792}$

$\boxed{\text{one half life} = 0.88 \text{ hrs}}$

8. $\ln\left(\frac{0.125}{2.00}\right) = -K(3.5)$

$$\frac{\ln\left(\frac{1}{16}\right)}{3.5} = -K$$

$$K = 0.79 \ \frac{1}{hrs}$$

9. 1.00 M to 0.30 in 1.88 hrs

$$\frac{1}{0.30M} - \frac{1}{1M} = K(1.88 \text{ hrs})$$

$$\frac{2.3}{1.88} = K$$

$$K = 1.2 \ \frac{1}{M \cdot hrs}$$

10. Rate equation: $R = K(NO_2Br)$
The intermediate is Br

11. $R = K(CH_3COHCH_3^+)(H_2O)$

$$K = \frac{(CH_3COHCH_3^+)(H_2O)}{(CH_3COCH_3)(H_3O^+)} \rightarrow \frac{K(CH_3COCH_3)(H_3O^+)}{(H_2O} = \frac{CH_3COHCH_3^+(H_2O)}{H_2O}$$

$$CH_3COHCH_3 = \frac{K((CH_3COCH_3)(H_3O^+)}{H_2O}$$

$$R = k\left(\frac{K((CH_3COCH_3)(H_3O^+)}{\cancel{H_2O}}\right)(\cancel{H_2O})$$

$$R = K(CH_3COCH_3)(H_3O^+)$$